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REMARKS/ARGUMENTS

The claims are 2-9 and 12. Claim 11 has been canceled and new method claim 12 has been added in order to overcome the rejections under 35 U.S.C. § 102 and § 112. Claim 9 has been amended to be placed in independent form and to overcome the rejection under 35 U.S.C. § 102. Claims 6-8 have been amended to correct minor errors in expression, and claims 2-5 have been amended to depend on new claim 12. Reconsideration is expressly requested.

The Applicants greatly appreciate the Examiner's detailed Office Action mailed on March 15, 2004. In view of the Office Action, the Applicants have amended the claims as set forth herein. Further, the Applicants would again like to explain the novelty and inventiveness (non-obviousness) of the invention according to the new and amended claims.

In the Office Action, the Examiner has correctly pointed out the differences between the present invention and *Phan* (U.S. Patent No. 6,661,429, AU 755524B, and DE 197 46 329 A1) as follows:

- (1) In the present apparatus and method (claims 9 and 12), the number of pixels in the image data to be displayed is

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much greater than the number of lamps in the display screen, whereas *Phan* has the same number of pixel data as there are pixels and lamps (page 3 lines 12-17 of the Office Action).

(2) The present apparatus and method (claims 9 and 12) carry out the "selecting step" and the "activating step" repetitively (i.e., more than once), whereas *Phan* performs the "selecting step" and the "activating step" once (page 3 lines 7-11, and page 6 last line to page 7 line 2 of the Office Action).

New method claim 12 and amended apparatus claim 9 have been drafted to clearly state the above-mentioned differences. New method claim 12 now clearly states that the "selecting step" and the "activating step" are carried out repetitively at high speed for all pixel groups. Amended apparatus claim 9 now clearly states the specific operations of the "data distribution control section" and the "activating circuit section". The features of claims 9 and 12 are neither disclosed in nor suggested by *Phan*. Details are given below.

As the Examiner correctly pointed out in the Office Action, the present invention is applicable to situations in which the number of pixels in the image data to be displayed is much

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greater than the number of lamps in the display screen.

Actually, the present invention was created in view of such a technical background.

More specifically, as with Hi-vision video signals, NTSC video signals, etc., the amount of data for images that are to be displayed on a display screen has increased in recent years (please refer to page 2 lines 13-23 of the present Description). The rapid development in the technology of providing high-quality high-resolution video-signals/images has given rise to a problem that "image expression performance of the NTSC video signal or the Hi-vision video signal have gone far beyond the expression capability of the current LED full color display apparatus" (please refer to page 2 lines 25-28 of the present Description). It is, however, difficult and costly to improve the performance of the display screen itself. The present invention was arrived at in view of such circumstances, and one main object is to provide a technique that allows high-quality high-resolution image data to be displayed on a display screen having a number of pixels (lamps) smaller than those of the image data.

The inventors of the present invention have found that it is possible to display a clear, fine, high-quality full-color

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image on a display screen that has a number of pixels (lamps) smaller than the number of pixels in the full-color image data by

- virtually assuming that the full-color image data is an aggregate of a first color data plane, a second color data plane, and a third color data plane (as in a color laser printer in which the full-color image data to be printed is divided into C (cyan) color data, M (magenta) color data, Y (yellow) color data, and K (black) color data, although this technique is quite different from the present invention),

- grouping the pixels in each of the first, second, and third data planes into first-color, second-color, and third-color pixel groups, respectively (wherein each group is made up of a plurality of (i.e., at least two) pixels),

- relating each of the first-color, second-color, and third-color pixel groups to first-color, second-color, and third-color lamps, respectively,

- repetitively selecting, at high speed on a pixel-by-pixel basis, a piece of color data corresponding to one of the several pixels in each of the first-color, second-color, and third-color pixel groups, and

- repetitively activating each of the first-color, second-color, and third-color lamps (which has been related

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to each of the first-color, second-color, and third-color pixel groups) in accordance with the selected color data.

Above are the steps involved in claims 9 and 12 of the present application.

The concept of the present invention might become clearer through a more specific example.

Please assume an example in which the number of pixels in a full-color image data (i.e., the number of pixels in each of the first-color, second-color, and third-color data planes) is four (4) times the number of each of the first-color, second-color, and third-color lamps on the display screen. More specifically, please assume an example in which the number of pixels in a full-color image data is forty (40) (and therefore, the number of pixels in the first-color data plane is forty (40), the number of pixels in the second-color data plane is forty (40), and the number of pixels in the third-color data plane is forty (40)), and the number of each of the first-color, second-color, and third-color lamps on the display screen is ten (10) (that is, the number of first-color lamps is ten (10), the number of

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second-color lamps is ten (10), and the number of third-color lamps is ten (10)).

In this example, the forty (40) pixels in the first-color data plane are grouped into ten (10) first-color pixel groups, the forty (40) pixels in the second-color data plane are grouped into ten (10) second-color pixel groups, and the forty (40) pixels in the third-color data plane are grouped into ten (10) third-color pixel groups. Therefore, there are four (4) pixels in each pixel group. Further, each of the ten (10) first-color pixel groups is related to one of the ten (10) first-color lamps, each of the ten (10) second-color pixel groups is related to one of the ten (10) second-color lamps, and each of the ten (10) third-color pixel groups is related to one of the ten (10) third-color lamps.

Then:

(i) a piece of first-color (second-color; and third-color) data corresponding to one of the four (4) pixels in each first-color (second-color; and third-color) pixel group is selected, and the first-color (second-color; and third-color) lamp related to each first-color (second-color; and third-color)

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pixel group is activated in accordance with the selected first-color (second-color; and third-color) data,

(ii) another piece of first-color (second-color; and third-color) data corresponding to another one of the four (4) pixels in each first-color (second-color; and third-color) pixel group is selected, and the first-color (second-color; and third-color) lamp related to each first-color (second-color; and third-color) pixel group is activated in accordance with the selected first-color (second-color; and third-color) data, and so forth...

and these selecting-and-activating actions are repeated at high speed on a pixel-by-pixel basis, and are carried out with respect to all of the pixel groups.

The novel process explained in detail above enables a display screen, which has a smaller number of pixels (lamps) than the number of pixels of the full-color image data, to display a clear, fine, high-quality full-color image because all of the pixels in the image data can be used for displaying on the display screen, without thinning out the data.

The novel concept and technique of the present invention explained above are neither disclosed in nor suggested by Phan. Therefore, the Applicants believe that the novelty and

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inventiveness (non-obviousness) of the present invention are not denied by Phan, and therefore, claims 9 and 12 should be allowed. Allowable claim 12 renders dependent claims 2-8 allowable as well.

In summary, claims 2-9 have been amended, claim 11 has been canceled and new claim 12 has been added. In view of the foregoing, it is respectfully requested that the claims be allowed and that this case be passed to issue.

Respectfully submitted,  
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Enclosure: Copy of Petition for 1-month Extension of Time

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Frederick J. Dorchak

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